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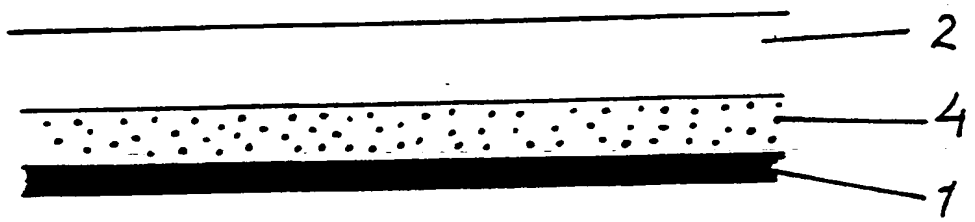
(54) Title: SELF-ADHESIVE LAMINATE



(57) Abstract

Self-adhesive laminate comprises a surface layer (2) or a like, on at least one side thereof an adhesive layer (1), and an additive layer (4) interposed between the surface layer (2) and the adhesive layer (1). The additive layer (4) is made of an elastic material having a cellular structure.

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Self-adhesive laminate

The present invention relates to self-adhesive laminates having a surface layer or a like, and on at least one side thereof an adhesive layer, and an additive layer interposed between the surface layer and the adhesive layer.

Self-adhesive products designed for a wide range of applications are used today. Such products comprise a surface layer, the back of which comprises a pressure sensitive adhesive layer. Before the self-adhesive product is used, the surface layer and the adhesive layer are situated on a release layer which is usually treated with silicon or a like material in a manner that there is a very poor adherence between the release layer and the adhesive layer, the latter being highly adherent to the surface layer. Thus, the surface layer together with the adhesive layer can be removed from the release layer for a fixation purpose followed by pressing it against an object to effect adhesion.

The self-adhesive products of this type cause often problems in the form of poor adherence particularly to uneven surfaces. In this aspect, reference is made to a schematic cross-sectional view of a conventional self-adhesive product shown by Fig. 1. The adhesive layer 1, being situated beneath the surface layer 2 against a support 3, is not attached to the support with its entire surface, but only at the points of protrusions in the support. This kind of situation prevails in particular when the thickness of the adhesive layer is relatively small. It would be possible, of course, to effect an improved adherence of a self-adhesive product to a support by increasing the thickness of the adhesive layer, .g. by carrying out the spreading of an adhesive layer in several phases. Such a proc dure results, however, in a poor

processability of the self-adhesive laminate in later phases of manufacture. Especially punching or cutting of the self-adhesive laminate to self-adhesive products of predetermined shape will be difficult, if the thickness of the adhesive layer is increased in order to obtain better adherence properties.

It is well-known practice to dispose various layers of additives (primer layers) between the adhesive and the surface layer. Such layers primarily

a. improve the adherence of the adhesive to the surface layer,

b. prevent the adhesive from penetrating to the inside of the surface layer.

Such layers do not, however, affect the final adherence of the self-adhesive material. The thickness of the layers of additives is usually ca. 5 to 10 % of the thickness of the adhesive layer.

The object of the present invention is to provide an improved self-adhesive product having good properties of adherence to all types of surfaces and in particular to uneven surfaces, despite a relatively thin adhesive layer. It can be mentioned as an example, that using an amount of ca. 20 g/m^2 of adhesive, properties of adherence corresponding to an amount of ca. 40 to 60 g/m^2 of adhesive can be obtained. The field of use is mainly labelling of very uneven surfaces (such as fibrous barrels, plywoods and other wooden surfaces as well as some plastic jerry cans), where a self-adhesive label could not be used previously without great difficulties. In order to realise the object, the self-adhesive laminate in accordance with the invention is mainly characterised in that the additive layer is made of an elastic material having a cellular structure. The additive layer enables the settling of the adhesive layer, being set against the support, in

a manner where it substantially follows the superficial shap of th support, thus increasing the ar a of adherence between the adhesive layer and the support in comparison to conventional solutions. The self-adhesive product is well adhered a support and morover, the additive layer does not cause difficulties in manufacture, especially as far as the punching or cutting of self-adhesive laminate into self-adhesive products of predetermined size is concerned.

The additive layer can be formed of either an expandable cellular structure or a foamed plastics material.

The invention can be applied in all types of self-adhesive laminate structures.

The invention will be explained more closely in the following description, wherein reference is made to an embodiment illustrated by the accompanying drawing. In the drawing

Fig. 2 shows a self-adhesive laminate placed on a support and

Fig. 3 shows an application of the self-adhesive laminate of the invention in cross-section.

In particular with reference to Fig. 2, the additive layer accomplishes the settling of the adhesive layer 1 substantially in conformity with the configuration of the surface of the support 3 due to the elastic properties of the additive layer.

In accordance with Fig. 2, the adhesive layer 1 consists of e.g. adhesive mat rial of the type self-adhesive or pressure sensitive. The thickness of the adhesive layer is for example 10 to 40 microns, preferably 25 microns (µm). The material of the surface

layer 2 can be paper or other material based on cellulose, plastic, or a combination thereof. The surface layer 2 can consist of one part or several parts on top of each other. The selection of the material for the surface layer is primarily connected with the purpose of use of the self-adhesive laminate as a finished self-adhesive product and it can therefore vary considerably according to the needs in question. The thickness of the surface layer is e.g. 50 to 80 (up to 120) microns (µm). The additive layer 4, the so-called primer layer, placed between the adhesive layer 1 and the surface layer 2, can be made of a plastic possessing expandable cellular structure or of a foamed plastic. The thickness of the additive layer 4 is for example 20 to 100 microns, preferably 40 to 70 microns (µm). A requirement for the additive layer is of course the firm adherence to the surface layer in course of its formation and on the other hand the firm adherence of the adhesive layer to the additive layer.

As an example of suitable material, one can mention a raw material which is commercially available under the trade mark EXPANCEL and is expandable by means of a suitable heat treatment. Inside the EXPANCEL microspheres is contained a liquid which will be gasified in the heat treatment. As a result, the microspheres are swollen and they form an elastic structure. The spheres are elastic, but nevertheless very strong, and they withstand even quite high compression pressures without breaking. The spheres are attached to each other by means of a binding agent. The layer of additives is formed on top of the surface material prior to coating with the adhesive, whereafter a structur according to Fig. 3 is obtained.

Another alternative of the additive layer is the use of a foamable plastic material as the additive layer. Such materials include e.g. a raw material sold under

the trademark PRIMAX as well as some other acrylic emulsions. The foamed PRIMAX emulsion is coated and dried. During the drying phase the air bubbles (the foam) remain inside the additive layer and impart an elastic cellular structure. The additive layer is formed on top of the surface layer prior to coating with the adhesive, whereafter a structure according to Fig. 3 is obtained.

The coating with additive layers can be effected either in the same machine as the coating with the adhesive (in-line) or in a separate phase prior to coating with the adhesive and laminating (off-line). Suitable coating methods comprise roll coating, screen roll coating and air brush coating. The drying can be carried out by means of hot air, infrared radiation or microwave radiation.

EXAMPLES

Same type of paper and same type of adhesive was used throughout all examples.

Adhesive paper (surface layer):

Vellum 80, supercalendred woodfree white label paper, grammage 80 g/m^2.

Backing paper (release paper):

Glassine 65, supercalendred woodfree surface-sized backing paper for self-adhesives, grammage 65 g/m^2. Paper is siliconised on one side in order to give suitable release properties.

Adhesive:

Acrylate dispersion, for example Acronal V205.

It shall be mentioned that the examples do not restrict the scope of protection of the invention, object of the present patent application. The elastic additive layer can be applied almost in all structures of

self-adhesive laminate, various combinations of surface and backing paper as well as various types of adhesives. Plastic surface and backing materials also suit within the scope of the invention.

The examples differ from each other only as to the type and thickness of the additive layer and the thickness of the adhesive layer.

Example 1 (control):
Without an additive layer. The thickness of adhesive: 20 microns (µm).

Example 2 (control):
An additive layer improving the adherence of the adhesive, thickness: 50 microns (µm). The thickness of adhesive: 20 microns (µm).

Example 3 (control):
An additive layer preventing the adhesive from penetrating into the paper, thickness: 50 microns (µm). The thickness of adhesive: 20 microns (µm).

Example 4 (control):
Without an additive layer. The thickness of adhesive: 40 microns (µm).

Example 5 (control):
Without an additive layer. The thickness of adhesive: 60 microns (µm).

Example 6:
A layer of the additive EXPANCEL, thickness: 50 microns (µm). The thickness of adh sive: 20 microns (µm).

Example 7:
A layer of the additive PRIMAX, thickness: 70 microns (µm). The thickness of adhesive: 20 microns (µm).

The following experiments were conducted using the self-adhesive materials of the examples:

- Determination of release-value. Release-value depicts the processability of the material. A high release value makes the processing more difficult.
- Adherence to uneven surfaces. Graduation: 0 = very poor, 5 = excellent.
- Processability with a self-adhesive processing machine (punchability and removal of mote). 0 = very poor, 5 = excellent.
- Cuttability with a slitter (fouling of the cutting blades). 0 = very poor, 5 = excellent.

RESULTS:

Example	1	2	3	4	5	6	7
Release-value	6	6	6	20	50	6	6
Adherence	0	1	0	3	5	5	5
Processability	5	5	5	2	1	5	5
Cuttability	5	5	5	2	1	5	5

The results show that only Examples 5, 6 and 7 give good adherence on uneven surfaces. The processability and cuttability of Example 7 is, however, very poor. Examples 6 and 7 show a very good stability between different property requirements.

Claims:

1. Self-adhesive laminate having a surface layer (2) or a like, and on at least one side thereof an adhesive layer (1), and an additive layer (4) interposed between the surface layer (2) and the adhesive layer (1), c h a r a c t e r i s e d in that the additive layer (4) is made of an elastic material having a cellular structure.

2. Self-adhesive laminate as claimed in claim 1, c h a r a c t e r i s e d in that the additive layer (4) is made of an expanded polymeric material having a cellular structure.

3. Self-adhesive laminate as claimed in claim 1, c h a r a c t e r i s e d in that the additive layer (4) is made of a foamed polymeric material.

4. Self-adhesive laminate as claimed in claim 1, c h a r a c t e r i s e d in that the ratio of thickness of the adhesive layer (1) to the additive layer (4) is 0,1 to 2,0, preferably 0,3 to 0,5.

5. Self-adhesive laminate as claimed in claim 1, c h a r a c t e r i s e d in that the thickness of the additive layer (4) is 20 to 100 microns, preferably 40 to 70 microns (µm).

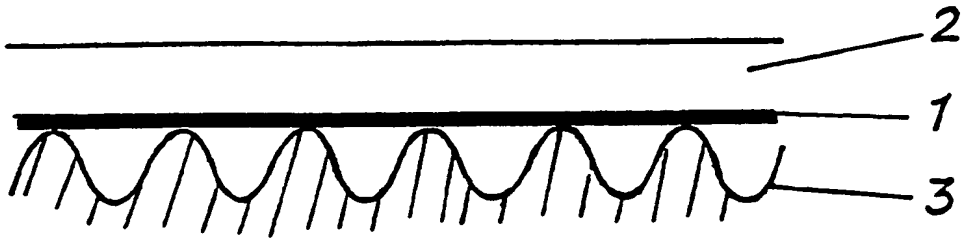

Fig 1

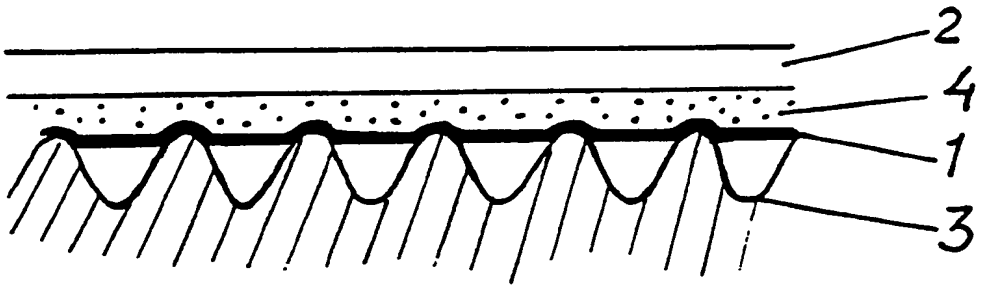

Fig 2

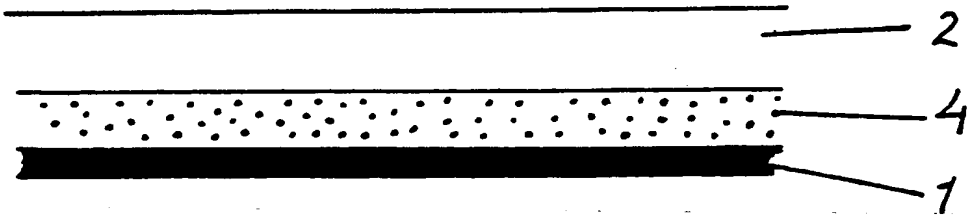

Fig 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI89/00056

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

C 09 J 7/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	C 09 J 7/02, /04
US Cl	428:40-42,261,304,310-311,315,343,353-354

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

SE, NO, DK, FI classes as above.

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	CH, A, 628 926 (GUNTER SCHWARZ) 31 March 1982 see page 2, column 1, lines 42-47 and column 2, lines 49-59 and figure 3 & FR, 2381092 DE, 2709800 JP, 53124545 US, 4199645 AT, 358146 CA, 1100363	1-5
X	DE, A, 1 594 140 (MINNESOTA MINING AND MANUFACTURING CO) 9 July 1970 see page 4, line 15-page 5, line 10 and claim 1	1-5
X	GB, A, 2 196 553 (THE KENDALL COMPANY) 5 May 1988 see abstract and claim 1 & US, 4705715 US, 4740416 .../...	1-5

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
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Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
	FR, 2605640 DE, 3736102 JP, 63178190	
X	US, A, 3 535 293 (CARL C ANDERSON) 20 October 1970 see column 4, lines 2-11, column 5, lines 62-66 and claim 14	1-5
X	US, A, 3 578 548 (GEORGE L WESP) 11 May 1971 see column 10, lines 7-15 and column 11, lines 3-6 & US, 3765972	1-5
X	Patent Abstracts of Japan, abstract of JP 59-91179, published 25 May 1984 see lines 1-5	1-5
A	GB, A, 1 312 850 (MINNESOTA MINING AND MANUFACTURING COMPANY) 11 April 1973 see page 1, lines 28-37	1-5